Abstract Submitted
for the DPP06 Meeting of
The American Physical Society

Simulations of 4D edge transport and dynamics using the TEMPEST gyro-kinetic code[1] T.D. ROGNLIEN, B.I. COHEN, R.H. COHEN, M.R. DORR, J.A.F. HITTINGER, G.D. KERBEL, W.M. NEVINS, Z. XIONG, X.Q. XU, LLNL — Simulation results are presented for tokamak edge plasmas with a focus on the 4D (2r,2v) option of the TEMPEST continuum gyro-kinetic code. A detailed description of a variety of kinetic simulations is reported, including neoclassical radial transport from Coulomb collisions, electric field generation, dynamic response to perturbations by geodesic acoustic modes, and parallel transport on open magnetic-field lines. Comparison is made between the characteristics of the plasma solutions on closed and open magnetic-field line regions separated by a magnetic separatrix, and simple physical models are used to qualitatively explain the differences observed in mean flow and electric-field generation. The status of extending the simulations to 5D turbulence will be summarized. The code structure used in this ongoing project is also briefly described, together with future plans.

[1]Work performed under auspices of USDOE through contract W7405-ENG-48 at UC LLNL.

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Date submitted: 24 Jul 2006 Electronic form version 1.4